AMENDMENTS TO THE CLAIMS

1. (Previously Presented) An ICP source for a semiconductor wafer plasma processing apparatus comprising:

an RF generator;

a series RF circuit that includes a substrate support and a peripheral ionization source, including at least one inductive element that generates an RF magnetic field into a plasma, connected to and surrounding the substrate support on the periphery of the substrate support, the substrate support and the peripheral ionization source forming a common planar surface having a substrate support surface at its center;

a matching network coupling the RF generator into the series RF circuit;

the RF generator coupling RF energy to the series RF circuit to bias the substrate support surface to capacitively couple to the plasma proximate the planar surface and to energize the peripheral ionization source to inductively couple to the plasma proximate the planar surface, thereby forming a high density plasma across the planar surface by both capacitively and inductively coupling energy thereto from the series RF circuit; and

a slotted Faraday shield between the inductive element and the plasma for facilitating the inductive coupling of energy from the inductive element into the plasma and for limiting the capacitive coupling of energy from the inductive element to the plasma.

2. (Canceled).

3. (Original) The ICP source of claim 1 wherein:

the peripheral ionization source includes an annular inductive element that surrounds the substrate support surface.

4. (Previously Presented) The ICP source of claim 1 wherein:

the peripheral ionization source includes an annular antenna that surrounds the substrate support surface and is capacitively-coupled in series with the substrate support surface to form the RF series circuit.

5. (Original) The ICP source of claim 1 wherein:

the matching network is connected to an output of the RF generator; and

the peripheral ionization source is capacitively connected at one end thereof to the matching network and is capacitively-coupled at an opposite end thereof to the substrate support surface.

6. (Original) The ICP source of claim 1 wherein:

the matching network is capacitively-coupled to the substrate support surface; and

the peripheral ionization source is capacitively-coupled to the substrate support surface and is capacitively-coupled to the chamber ground.

7. (Original) The ICP source of claim 1 wherein:

the substrate support surface is an electrostatic chuck.

8. (Original) The ICP source of claim 1 wherein:

the RF generator is the sole source of RF energy to the substrate support surface and the peripheral ionization source.

9. (Original) The ICP source of claim 1 wherein:

the peripheral ionization source is capacitively-coupled to the substrate support surface; and

the matching network has impedances in series with the peripheral ionization source that are approximately tuned to the frequency of the RF generator.

10. (Original) The ICP source of claim 1 wherein:

the peripheral ionization source is configured to inductively couple RF energy into the plasma to form a high density ring-shaped plasma concentrated in the direction of the perimeter of the substrate support surface.

11. (Original) The ICP source of claim 1 wherein:

the matching network is capacitively-coupled to the substrate support surface;

the matching network has an input and an output and includes an inductor connected in series between the input and output; and

the peripheral ionization source is connected in series with the inductor of the matching network.

12. (Original) The ICP source of claim 1 wherein:

the matching network is capacitively-coupled to the substrate support surface;

the matching network has an input and an output and includes an inductor connected in series between the input and output; and

the peripheral ionization source is connected in parallel with the inductor of the matching network.

13. (Original) The ICP source of claim 1 wherein:

the matching network is capacitively-coupled to the substrate support surface; and

the matching network has an input and an output and has the peripheral ionization source connected in series between the input and output in lieu of a separate inductor.

14. (Original) The ICP source of claim 1 wherein:

the matching network is capacitively-coupled to the substrate support surface;

the matching network has an input and an output and has the peripheral ionization source connected in series between the input and output in lieu of a separate inductor; and

the peripheral ionization source includes individual inductive elements connected in series through stray mutual capacitance.

Claims 15-25. (Canceled).

26. (Previously Presented) An ICP source for a semiconductor wafer plasma processing apparatus having a vacuum chamber comprising:

an RF generator located outside of the vacuum chamber;

a series RF circuit that includes a substrate support and a peripheral ionization source, including at least one inductive element that generates an RF magnetic field into a plasma, connected to and surrounding the substrate support on the periphery of the substrate support, the substrate support and the peripheral ionization source fixed in a common plane with a substrate support surface;

the peripheral ionization source being located inside of the vacuum chamber;

a matching network coupling the RF generator into the series RF circuit;

the RF generator coupling RF energy to the series RF circuit to bias the substrate support surface to capacitively couple to the plasma proximate the planar surface and to energize the peripheral ionization source to inductively couple to the plasma proximate the planar surface, thereby forming a high density plasma across the planar surface by both capacitively and inductively coupling energy thereto from the series RF circuit; and

a slotted Faraday shield between the inductive element and the plasma for facilitating the inductive coupling of energy from the inductive element into the plasma and for limiting the capacitive coupling of energy from the inductive element to the plasma, wherein the slotted Faraday shield is located inside of the vacuum chamber.